

and we see that, if $A = B = C = R$, as is the case except in a crystalline medium, the ellipsoid is—

$$R(x^2 + y^2 + z^2) + (Px + Qy + Rz)^2 + (\alpha x + \beta y + \gamma z)^2 = d;$$

so that, if $Px + Qy + Rz = L$, $\alpha x + \beta y + \gamma z = \lambda$.

$L + i\lambda$ and $L - i\lambda$ are the imaginary circular reactions of the ellipsoid,¹ and consequently the intersection of L and λ , whose direction cosine are proportional to $Q\gamma - R\beta$, &c., is the major axis of the ellipsoid, when the above signs are attributed to L^2 and λ^2 . As any ellipsoid can be expressed in this form by referring it to its circumscribing sphere and the corresponding planes of circular section, it is apparent that any polarized state of the turbulent motion can be built up of P, Q, R , and α, β, γ , polarizations. The axis of the ellipsoid mentioned above represents the flow of energy in the medium during the propagation of a disturbance.

I am inclined to think that Sir William Thomson's fear that diffusion would vitiate these investigations would be avoided either by supposing the turbulent liquid to consist of interlocked vortex rings, or of infinite intercrossing lines; and in either case a natural hypothesis would be that matter consisted of free vortex rings.

GEO. FRAS. FITZGERALD.

Trinity College, Dublin, April 26.

The New Eruption of Vesuvius.

ON April 29, 30, and May 1, a constant series of explosions (*boiti*) and rumblings accompanied by earthquakes, which shook the southern foot of Vesuvius, were very noticeable at Resina. About 2 a.m., on May 2, part of the new cone of eruption (formed during the last ten months) fell in, showing that the internal support of the lava column had been removed, in consequence of this filling the new dyke, the formation of which had given origin to the preceding sonorous and mechanical disturbances. On the same day at 3 p.m. the lava sank still lower in the conduit on account of the dyke reaching the surface at the upper part of the great cone. More of the eruptive cone crumbled in, and of course simultaneously a considerable outpour of lava took place from the dyke fissure which is situated on the south-east side of the great cone. This outflow soon formed a long tongue of lava reaching to the Pedimentina or lower.

My friend Mr. George Bidder, Jun., who is studying at the Zoological Station here, was fortunately able to visit the mountain yesterday (May 3), and much of the information in this letter I have to thank him for. Unfortunately the extremely bad weather has prevented the upper part of the mountain being examined, so that accurate information as to the position and length of the fissure has not been obtainable; I hope, however, to make the ascent to-morrow, and will then send a more detailed account for your next issue. So far as the facts at hand are available, it would appear that this eruption is of small importance, being an analogue of that of May 2, 1885, and that, therefore, the lava will hardly reach cultivated ground.

A short glimpse of the summit of the mountain this evening shows that much of the eruptive cone still exists, whilst the reflection from the flowing lava is much feebler than yesterday evening. Lastly, a single faint glimmer this evening at the vent demonstrates the fact that the lava has not sunk very deep in the chimney. The eruption, or more properly *disruption*, was coincident with a marked barometric depression.

Naples, May 4.

H. J. JOHNSTON-LAVIS.

The Sailing Flight of the Albatross.

I have been much interested by the letter of Mr. A. C. Baines (*NATURE*, May 2, p. 9) upon this subject. In the year 1883 ("The Soaring of Birds," *NATURE*, vol. xxvii. p. 534) I suggested that the explanation of these puzzling performances might be found in the increase of wind with height. To take advantage of this, the bird must rise against the wind and fall with it; but, at the time referred to, I had before me only the observations of Mr. Peal, in Assam, on the flight of pelicans, in which this feature is not alluded to. In Mr. Baines's observations, the omission is supplied, and there seems little reason to doubt that the true explanation of the flight of the albatross has been arrived at. In the case of the pelican soaring to a great eleva-

tion, it is less easy to understand how the differences of horizontal velocity can be sufficient.

Reference may be made to a paper by Mr. H. Airy (*NATURE*, vol. xxvii. p. 590), in which the matter is further discussed. Similar views have also been put forward more recently by an American author, whose name I have, unfortunately, forgotten. Terling Place, Witham, May 6.

RAYLEIGH.

"Giphantia."

IN a curious little work, entitled "Giphantia," the full title of which I subjoin, there is, at pp. 95-98, a passage that may have some interest in connection with the early history of photography, and of which I therefore subjoin a copy.

The Camp, Sunningdale, April 29.

J. D. HOOKER.

"Giphantia: or, a View of what has passed, what is now passing, and, during the Present Century, what will pass, in the World." Translated from the Original French, with Explanatory Notes. (London: Printed for Robert Horsfield, in Ludgate Street, 1761.)

"Thou knowest that the rays of light, reflected from different bodies, make a picture and paint the bodies upon all polished surfaces, on the retina of the eye, for instance, on water, on glass. The elementary spirits have studied to fix these transient images: they have composed a most subtle matter, very viscous, and proper to harden and dry, by the help of which a picture is made in the twinkling of an eye. They do over with this matter a piece of canvas, and hold it before the objects they have a mind to paint. The first effect of the canvas is that of a mirror; there are seen upon it all the bodies far and near, whose image the light can transmit. But what the glass cannot do, the canvas, by means of the viscous matter, retains the images. The mirror shows the objects exactly; but keeps none; our canvases show them with the same exactness, and retains them all. This impression of the images is made the first instant they are received on the canvas, which is immediately carried away into some dark place; an hour after, the subtle matter dries, and you have a picture so much the more valuable, as it cannot be imitated by art nor damaged by time. We take, in their purest source, in the luminous bodies, the colours which painters extract from different materials, and which time never fails to alter. The justness of the design, the truth of the expression, the gradation of the shades, the stronger or weaker strokes, the rules of perspective, all these we leave to nature, who, with a sure and never-erring hand, draws upon our canvases images which deceive the eye and make reason to doubt, whether, what are called real objects, are not phantoms which impose upon the sight, the hearing, the feeling, and all the senses at once.

"The Prefect then entered into some physical discussions, first, on the nature of the glutinous substance which intercepted and retained the rays; secondly, upon the difficulties of preparing and using it; thirdly, upon the struggle between the rays of light and the dried substance, three problems, which I propose to the naturalists of our days, and leave to their sagacity."

Geological Photography.

IN the report of the Annual Conference of Delegates of Corresponding Societies of the British Association (*vide NATURE*, vol. xxxix. p. 187), reference is made to the proposed appointment of a Committee to collect and register photographs of localities, sections, or other features of geological interest in the United Kingdom. Several Societies have already attempted local photographic surveys, but the need is felt to secure uniformity of action by all the Societies interested, and to arrange for the photographs to be available for teaching and other purposes when needed. In order that steps may be taken to arrange for the practical working of the proposed scheme at the forthcoming meeting of the British Association at Newcastle, I am desirous of invoking the kind aid of those of your readers who have interested themselves in the photography of local geological features (especially of typical and temporary sections) in favouring me with the following information:—

(1) A list of photographs already taken, illustrating given localities or sections; and

¹ This was remarked to me by Prof. Lyle, of Melbourne, while I was recently speaking to him upon this subject.

(2) The names of local Societies, or persons who are willing to arrange for a photographic survey for geological purposes in their district.

The information afforded me will be placed before the Geological Section of the British Association at their next meeting, and I trust to receive many offers of valuable assistance from different parts of the country. If copies of photographs are sent me they will be carefully kept for exhibition at the meeting. Several geological friends have favoured me with suggestions in regard to size of photograph, scales of height, length, and other details, which will all be carefully considered. Photography is now so popular and easy of accomplishment that there should be no difficulty in organizing local photographic surveys for the purpose I have indicated.

It was arranged at Bath that the delegates should get their Societies to think the matter over, and that I should meanwhile endeavour to prepare a list of local geological photographs already available for study. I am communicating with the Societies with this object, but your insertion of this letter will further aid me in directing attention to the subject over a wider circle than I am able to reach.

OSMUND W. JEFFS.

12 Queen's Road, Rock Ferry, Cheshire, April 23.

Columnar Structure in Ice.

I HAVE just read Mr. James McConnel's interesting and important paper on the plasticity of ice (*NATURE*, vol. xxxix. p. 203), and as he remarks that it would be interesting to know whether the columnar structure he describes as occurring in the ice of the St. Moritz Lake has been observed in England, I venture to ask you to record the fact that I recollect seeing a precisely similar structure in the ice of the lake in Kew Gardens in February 1880. The phenomenon occurred during a thaw that preceded by a day or two the memorable snowstorm of that month, and the aspect of the ice, where it had been broken through, recalled to my mind that of the well-known fossil *Lithostrotion basaltiforme*, as it was built up of vertical columns, irregularly hexagonal in section, about a quarter of an inch in diameter and of equal length with the thickness of the ice, about 4 or 5 inches. If I remember aright, bright sunshine had been thawing the ice during the day. I made a note on the occurrence at the time, but as I came to India shortly after I do not know what has become of it.

T. D. LA TOUCHE,
Geological Survey of India.

Camp near Cherrapunji, Assam, March 4.

Brilliant Meteor.

I SEND you an account of a meteor I saw on Saturday evening last, thinking it may interest others as much as it has myself. I was lamp-signalling at the time (8.55 p.m.), and saw far the largest meteor I have ever seen. It was far brighter than any planet, or even than a good rocket. It seemed to start from the Great Bear, and fall in a north-east direction half-way to the horizon. I immediately stopped my message, and asked my companion (a mile distant) if he had seen the meteor. He replied he had not, which surprised me, though he had the town lights not far behind him, and he was looking away from the north-east. I had not finished asking him about the meteor, when I heard a loud but distant report, which I can only put down to the same source. It sounded like distant artillery, or more particularly like a six-pounder at six miles distance on a still evening. The interval of time between the sight and the sound I should estimate at a minute.

T. HERBERT CLARK.

Wingfield, Trowbridge, April 30.

A New Mountain of the Bell.

HAVE the kindness to correct two typographical errors in my communication describing the "New Mountain of the Bell," printed in your issue of April 25. On p. 607, col. 2, line 7, an unfortunate superfluous comma after the word quartz should be expunged, so as to read quartz pebbles and veins.

Near the bottom of the same column "modern gong" should read "wooden gong." As a matter of fact the *Nagous* is far from "modern." It consists of a heavy plank nearly 2 inches

thick, 14 feet long, and suspended by ropes at two points 4 feet from either end. When struck with a wooden mallet, this primitive gong emits a loud sound. At the Monastery of St. Catherine, three of these are in use, one small one to call to their noonday meal the numerous *cats* which inhabit the rambling old building.

H. CARRINGTON BOLTON.

London, May 1.

KLEIN'S "IKOSAHEDRON."¹

IT has recently been said, with great truth, that pure mathematics is at the present moment the most progressive of all the sciences. It is, we must confess with sorrow, equally true, that the means at the disposal of English pure mathematical students for making themselves familiar with the recent advances in their science are deplorably scanty. This is not the place to discuss the reasons why it has so long been the case in this island that the stars of our mathematical firmament have been

"*Étoiles qui filent, filent et disparaient!*"

and not fixed stars, with minor but still useful bodies around them, receiving their light and completing their systems. But it is obvious that this shortcoming has been closely associated with the backward state of our textbook literature in pure mathematics. There exist in the English language so few books through whose pages the reader can so much as descry the frontier land of pure mathematics that every addition is an event of importance. Such an addition is Mr. Morrice's translation of Klein's "*Ikosahedron*." Klein's book is in many respects the most charming piece of modern mathematical writing that has appeared for many a day. It is a rare combination of great originality with wide and far-reaching views, Teutonic minuteness of scholarship, and a candour in dealing with the work of others which does not always accompany the other high qualities just mentioned. If we were asked to name a single book that would beyond others give the reader a comprehensive glance over the wide field of modern pure mathematics, and give him an introduction to this study which would at once both interest and instruct him, we should without hesitation name Klein's "*Ikosahedron*." The work interweaves, in a singularly felicitous and natural way, the most remote and apparently unconnected branches of higher pure mathematics. In the course of its perusal the reader will make acquaintance with the geometry of the regular solids, the theory of substitutions, the theory of functions of a complex variable, invariants, the theory of linear differential equations, Riemann's researches on the hypergeometric series, Galois's theory of the resolution of algebraic equations, elliptic functions, Plücker's line geometry, and the special theory of quintic equations. This enumeration will sufficiently indicate the wide sweep of the work; but let not the reader be alarmed. If he is ignorant of all these subjects, so much the more will he enjoy the pleasure of Prof. Klein's introduction to them. He will find that he is led, by easy and pleasant ways, first to see the interest and importance of these subjects, then to panoramic aspects of them, and finally to just so much detail as will make him (if he be right-minded) thirst for more. Speaking from past experience, we should say that one of the greatest disadvantages of modern specialism is the repulsive force which it establishes at every point to the entrant. Let an English student sit down, for example, to Jordan's "*Théorie des Substitutions*." He is at once plunged into a sea of new terms and definitions. He is baffled by a kaleidoscopic array of subtle distinctions between con-

¹ "Lectures on the Icosahedron, and the Solution of Equations of the Fifth Degree." By Felix Klein. Translated by George Gavin Morrice, M.A., M.B. (London: Trübner and Co., 1888.)